

REMARKS

Claims 1-20 were pending in this application.

Claims 1-4, 8-10, 14-16, and 20 have been rejected.

Claims 5-7, 11-13, and 17-19 have been objected to.

Claims 1 and 13 have been amended as shown above.

Claims 1-20 remain pending in this application.

Reconsideration and full allowance of Claims 1-20 are respectfully requested.

I. ALLOWABLE CLAIMS

The Applicants thank the Examiner for the indication that Claims 5-7, 11-13, and 17-19 would be allowable if rewritten in independent form to incorporate the elements of their respective base claims and any intervening claims. Because the Applicants believe that the remaining claims in this application are allowable, the Applicants have not rewritten Claims 5-7, 11-13, and 17-19 in independent form.

II. OBJECTIONS TO CLAIMS

The Office Action objects to various informalities in Claims 1 and 13. The Applicants have amended Claims 1 and 13 as shown above to correct the noted informalities. The Applicants respectfully request withdrawal of the objections to the claims.

III. REJECTION UNDER 35 U.S.C. § 103

The Office Action rejects Claims 1-3, 8, 9, and 14-16 under 35 U.S.C. § 103(a) as being

unpatentable over Prior Art of Present Invention (“*PAPI*”) in view of U.S. Patent No. 6,278,519 to Rosencwaig et al. (“*Rosencwaig*”). The Office Action rejects Claims 4 and 10 under 35 U.S.C. § 103(a) as being unpatentable over *PAPI* and *Rosencwaig* in further view of U.S. Patent No. 6,639,228 to Yen (“*Yen*”). The Office Action rejects Claim 20 under 35 U.S.C. § 103(a) as being unpatentable over *PAPI* and *Rosencwaig* in further view of U.S. Patent No. 6,277,657 to Nozawa et al. (“*Nozawa*”). These rejections are respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. (*MPEP* § 2142; *In re Fritch*, 972 F.2d 1260, 1262, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992)). The initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention is always upon the Patent Office. (*MPEP* § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 U.S.P.Q. 785, 788 (Fed. Cir. 1984)). Only when a *prima facie* case of obviousness is established does the burden shift to the Applicant to produce evidence of nonobviousness. (*MPEP* § 2142; *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993)). If the Patent Office does not produce a *prima facie* case of unpatentability, then without more the Applicant is entitled to grant of a patent. (*In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992); *In re Grabiak*, 769 F.2d 729, 733, 226 U.S.P.Q. 870, 873 (Fed. Cir. 1985)).

A *prima facie* case of obviousness is established when the teachings of the prior art itself suggest the claimed subject matter to a person of ordinary skill in the art. (*In re Bell*, 991 F.2d 781, 783, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993)). To establish a *prima facie* case of

obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed invention and the reasonable expectation of success must both be found in the prior art, and not based on the Applicant's disclosure. (*MPEP § 2142*).

Regarding Claim 1, the Office Action acknowledges that *PAPI* fails to disclose almost every element of Claim 1. In particular, the Office Action acknowledges that *PAPI* fails to disclose performing a "thermal oxidation procedure on [a] silicon germanium film to create a layer of thermal oxide over said silicon germanium film," "measuring a thickness of said layer of thermal oxide," and "providing a correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration of said silicon germanium film." The Office Action asserts that *Rosencwaig* discloses these elements of Claim 1 and that it would be obvious to modify *PAPI* with *Rosencwaig*. (*Office Action, Page 3, Last paragraph – Page 4, Last paragraph*).

Rosencwaig recites a system for determining the total thickness of one or more layers of material in a thin film stack. (*Abstract; Col. 12, Line 64 – Col. 13, Line 1*). A reference ellipsometer generates a light beam that reflects off of a reference sample. (*Col. 3, Lines 13-21*). An analyzer analyzes polarized components of the light beam, and a detector measures the intensity of the light beam. (*Col. 3, Lines 21-25*). A processor determines the optical properties of the reference sample (such as its thickness) using the polarization state of the light beam, the

wavelength of the light beam, and a known total or partial composition of the reference sample. (*Col. 3, Lines 25-32; Col. 9, Lines 25-29*). The determined optical properties can be used to calibrate other optical measurement devices. (*Col. 3, Lines 32-37*). The optical measurement devices can also be used to take measurements of the thin film stack, and these measurements (along with the total thickness of the stack) can be used to determine the composition of individual layers in the stack. (*Col. 3, Lines 56-64; Col. 13, Line 6 – Col. 14, Line 59*).

First, *Rosencwaig* lacks any mention of providing a “correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration of said silicon germanium film.” *Rosencwaig* simply recites that a system can determine the thickness of a stack of thin films. Separately, different measurements and the total thickness of the stack can be used to determine the composition of individual layers in the stack. However, *Rosencwaig* is completely silent regarding any type of “correlation” that relates a “thickness of a layer of thermal oxide created over a silicon germanium film” to a “germanium concentration of said silicon germanium film” as recited in Claim 1.

Second, the Office Action fails to show that *PAPI* or *Rosencwaig* discloses, teaches, or suggests determining a germanium concentration of a silicon germanium film “by identifying a germanium concentration that corresponds to said measured thickness of said layer of thermal oxide in accordance with said correlation.” *PAPI* lacks any mention of using any type of correlation that relates a measured thickness of a layer of thermal oxide to a germanium concentration in order to determine the germanium concentration of a silicon germanium film.

Similarly, *Rosencwaig* lacks any mention of using the measured thickness of a thermal oxide layer to determine the germanium concentration of a silicon germanium film. Instead,

Rosencwaig simply recites that the total thickness of a thin film stack, along with various other measurements of the stack, can be used to determine the compositions of the various layers in the stack. (*Col. 3, Lines 56-64*). *Rosencwaig* never recites that the thickness of a thermal oxide layer can be used to determine the germanium concentration of a silicon germanium film based on a “correlation” of thermal oxide thickness to germanium concentration.

The Office Action asserts that *PAPI* discloses “determining said germanium concentration of said silicon germanium film by identifying a germanium concentration by an analyze results of SIMS method.” (*Office Action, Page 3, First paragraph*). However, Claim 1 recites determining the germanium concentration of a silicon germanium film “by identifying a germanium concentration that corresponds to said measured thickness of said layer of thermal oxide in accordance with said correlation.” The Office Action makes no attempt to show that *Rosencwaig* discloses, teaches, or suggests determining a germanium concentration using a “measured thickness” of a “layer of thermal oxide” in accordance with a “correlation” that relates a thickness of the thermal oxide layer to the germanium concentration. This would be particularly difficult given that the only reference to “germanium” in *Rosencwaig* involves a statement that a substrate can be formed from germanium (*Col. 12, Lines 48-50*).

Third, even if *Rosencwaig* discloses using the total thickness of the layers in the stack to determine the germanium concentration of one of the layers in the stack, this fails to anticipate or suggest the elements in Claim 1. Claim 1 recites that the measured thickness of a thermal oxide layer created over a silicon germanium film is used to determine the germanium concentration of the silicon germanium film. In other words, the thickness of one layer (the thermal oxide layer) is used to determine the germanium concentration of a separate layer (the silicon germanium

film). *Rosencwaig* says absolutely nothing about using the thickness of one layer to determine the germanium concentration of a separate layer.

The Office Action simply shows that *PAPI* discloses a technique for determining the germanium concentration of a silicon germanium film. The Office Action also simply shows that *Rosencwaig* discloses measuring the total thickness of one or more layers in a stack and determining the composition of individual layers (using the total thickness and other measurements). The Office Action cites absolutely nothing in either reference showing that the measured thickness of a thermal oxide layer can be used, along with a correlation of thermal oxide thickness to germanium concentration, to determine the germanium concentration of a silicon germanium film.

For these reasons, the Office Action does not establish a *prima facie* case of obviousness against Claim 1 (and its dependent claims).

Claim 9 recites “measuring a thickness of each of said layers of thermal oxide” and “correlating said thickness of each of said layers of thermal oxide with a corresponding value of germanium concentration.” As noted above, both *PAPI* and *Rosencwaig* fail to disclose, teach, or suggest correlating a thickness of a thermal oxide layer with a germanium concentration.

For these reasons, the Office Action does not establish a *prima facie* case of obviousness against Claim 9 (and its dependent claims).

Claim 14 recites “measuring a thickness of said layer of thermal oxide in real time,” “providing a correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration of said silicon germanium film,” and “determining said germanium concentration of said silicon germanium film in real time by

identifying a germanium concentration that corresponds to said measured thickness of said layer of thermal oxide in accordance with said correlation.” As noted above, both *PAPI* and *Rosencwaig* fail to disclose, teach, or suggest using a correlation of thermal oxide layer thickness to germanium concentration in order to determine the “germanium concentration” of a “silicon germanium film.”

For these reasons, the Office Action does not establish a *prima facie* case of obviousness against Claim 14 (and its dependent claims).

Accordingly, the Applicants respectfully request withdrawal of the § 103 rejections and full allowance of Claims 1-4, 8-10, 14-16, and 20.

IV. CONCLUSION

The Applicants respectfully assert that all pending claims in this application are in condition for allowance and respectfully request full allowance of the claims.

SUMMARY

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this application, the Applicants respectfully invite the Examiner to contact the undersigned at the telephone number indicated below or at wmunck@munckbutrus.com.

The Commissioner is hereby authorized to charge any fees connected with this communication (including any extension of time fees) or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

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